

Optical Document Security

Third Edition

Rudolf L. van Renesse

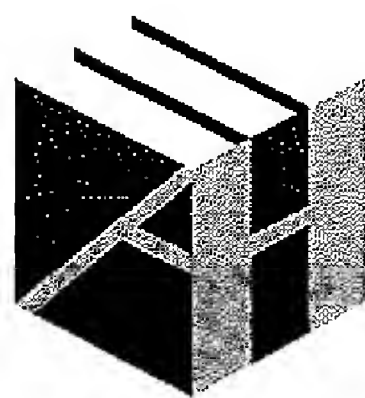
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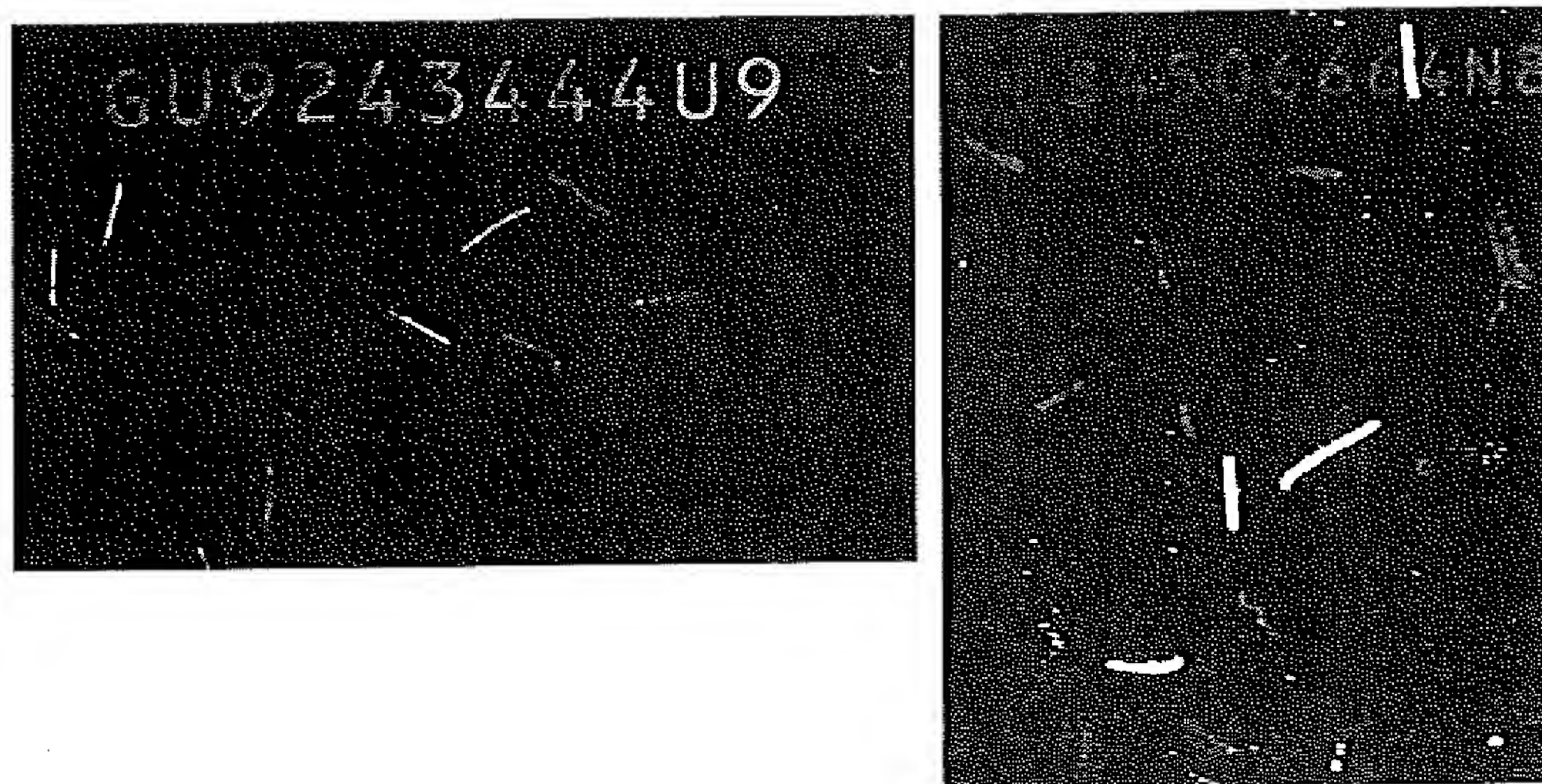


Figure 3.12 Security fibers fluorescent in red, yellow, and blue on German DM100 note. Genuine note (left) and counterfeit note with printed fibers (right). Note that the numbering on the genuine as well as the counterfeit note is printed in green fluorescent ink.

3.2.9 Planchets

During paper production, tiny disks about 2 mm in diameter, referred to as *planchets* or *confetti*, can be added to the paper furnish. Because of the random dispersion, no document will contain planchets (or security fibers) in corresponding positions. Planchets can be colored (see Figure 3.13) or colorless and only visible under ultraviolet irradiation. Fluorescent planchets may appear colored in visible

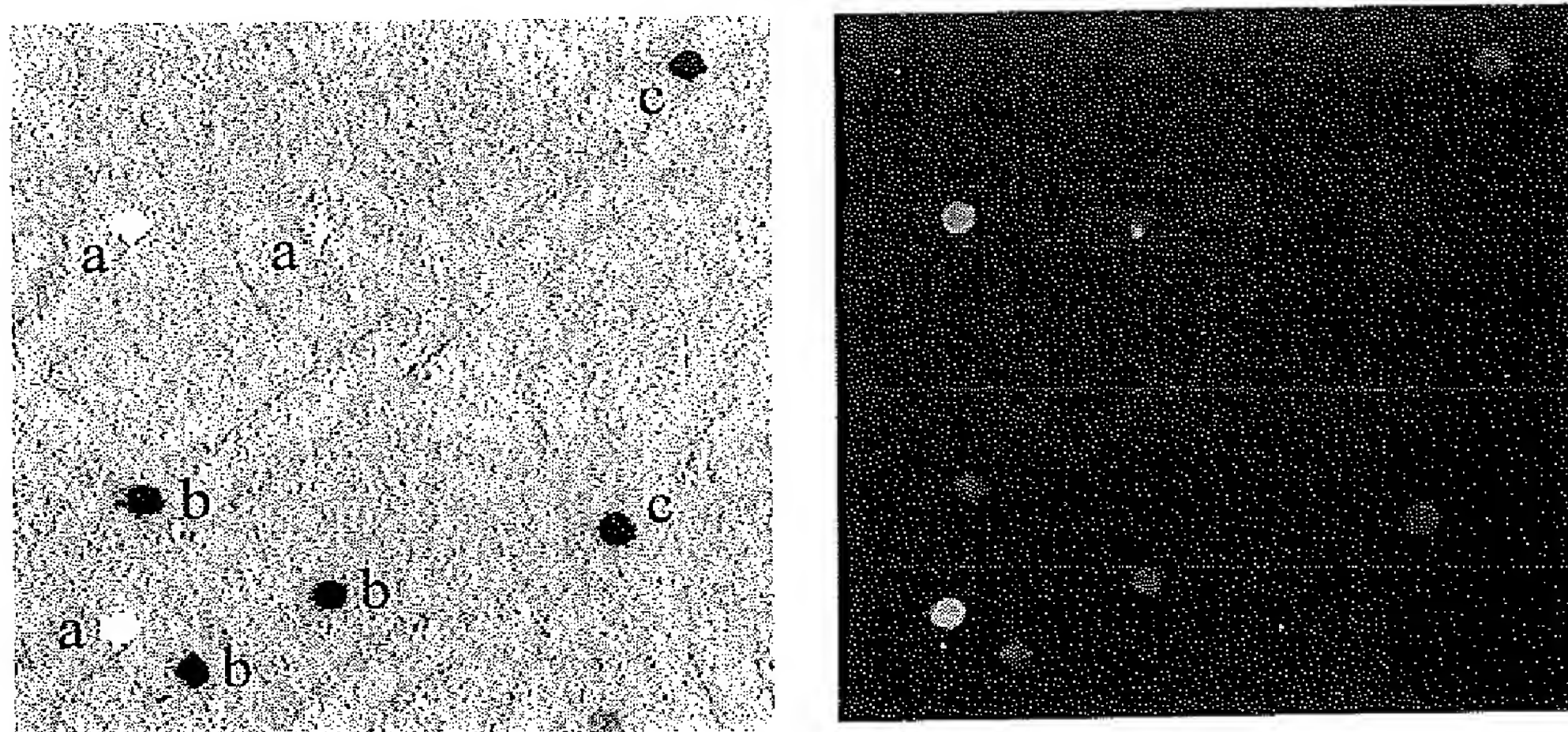


Figure 3.13 Fluorescent planchets with various colors (Iridium security paper). Left: round colored planchets in white light—yellow (a), blue (b), and magenta (c). Right: the same planchets fluorescing under ultraviolet irradiation in light blue (a), blue (b), and red (c). (Sample courtesy of: Aussedat-Rey Group, France.) (Original image width: 34 mm.)

light as well. Planchets may even contain micro printing or chemicals that change color under exposure by ammonia vapor.

Planchets can also be iridescent like those in the paper of the old Dutch DFL 10, DFL 100, and DFL 1000 series (see Figure 3.14), and they generally appear randomly dispersed in a band a few centimeters wide.

Iridescent planchets consist of a stack of numerous alternating thin thermoplastic films—for instance, of coextruded polypropylene and polycarbonate (see Chapter 7, Section 7.2.7). If these iridescent planchets are successively observed in specular reflection and in diffuse reflection, complementary colors are alternately displayed, such as yellow versus blue-violet or green versus magenta. This co-extruded multi-layer material is widely available, but applying tiny iridescent disks of this material to each single counterfeit note is a cumbersome task. Characteristic of planchets is that they can be integrally detached from the paper surface with a needle (like security fibers), contrary to printed, painted, or colored-pencil imitation planchets. Obviously, the latter is not an efficient inspection routine. Crude imitations of iridescent planchets are produced by printing or drawing with metallic ink.

It is noted that bank notes that have been laundered may lose many planchets, if not all, in the process. The absence of iridescence is an indication of counterfeiting, although it must be considered that worn and laundered genuine notes may have totally lost their planchets. In that case, the empty places show up as blanks in the printed areas. The presence of iridescent planchets appears to offer significant proof of authenticity; although the iridescent material is widely available, this seems not to have appeared on counterfeits.

3.2.10 Embedded Thread

A thin polyester ribbon, about 0.5 to a few millimeters wide, can be embedded in the paper furnish during paper production. In its simplest form, such a *security thread* is rendered opaque with a white or metallic coating. Also, it can be provided with transparent inks to render it a certain color. Furthermore, the thread can be coated with fluorescent or magnetic inks.

Security threads can be further metal coated and subsequently be locally demetallized to create transparent positive or negative microlettering (see Figure 3.15). Embedded threads with microlettering are often imitated with the use of printing techniques. However, the contrast of the imitations is generally notably inferior to that of genuine security threads and this can be easily established by comparing a questioned note with a genuine note. If professional counterfeiters have

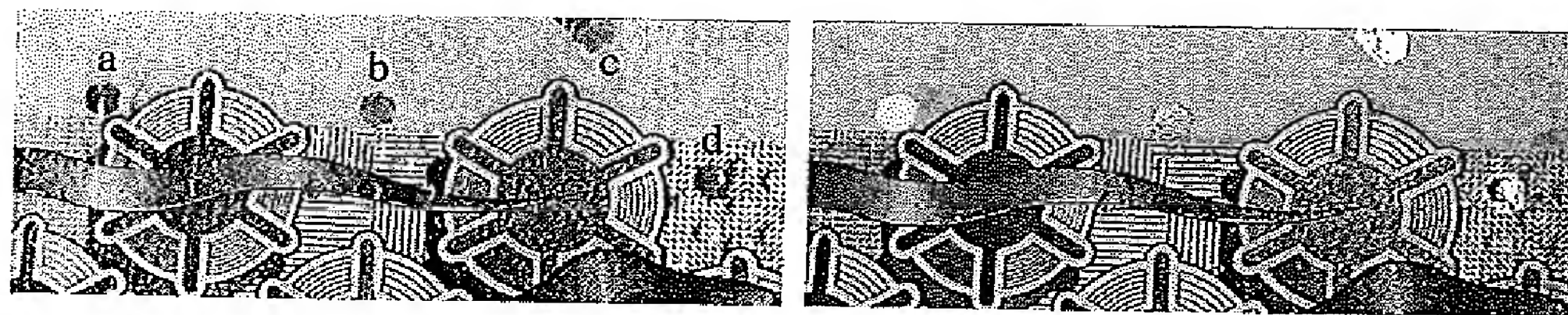


Figure 3.14 Iridescent hexagonal planchets on Dutch 100 guilder note in detail. Left: diffuse reflection in the colors magenta (a), blue (b), blueviolet (c) and magenta (d). Right: specular reflection in the complementary colors green (a), reddish (b), yellow (c), and green (d). (Image width: 30 mm, planchets' diameter: 2 mm.)